UNITED STATES PATENT AND TRADEMARK OFFICE

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/082,450	ZHU ET AL.
	Examiner	Art Unit	
	HABTE MERED	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _9/30/08_.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _2,3,5,6 and 11-14_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _2,3,5, 6 and 11-14_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on _23 February 2002_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All b) ☐ Some * c) ☐ None of:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____.
      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____ .

DETAILED ACTION

Response to Amendment

1.   The amendment filed on 9/30/2008 has been entered and fully considered.

2.   Claims 2, 3, 5, 6 and 11-14 are pending in the instant Application. Claims 1, 4,

and 7-10 have been previously cancelled. Claims 2, 3, 5, and 6 are the base

independent claims and are not amended.

Response to Arguments

3.   Applicant's arguments with respect to claims 2, 3, 5, and 6 have been considered

but are moot in view of the new ground(s) of rejection based on Yang'99 in view of

Chen'360.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

5.   **Claims 2, 3, 5, 6, and 11-14** are rejected under 35 U.S.C. 103(a) as being

unpatentable over Yang et al (Yuan Yang and Jianchao Wang, "A New Self-Routing

Multicast Network", IEEE, December 1999) in view of Chen et al (US 5666360).

Regarding **claim 2**, Yang'99 discloses a method for routing packets through a

switching network, wherein the switching network includes multiple stages of switching

elements **(See Figures 1, 2, 4, and 5)**, each one of the switching elements receiving

packets as local input packets on its input ports and producing packets as local output

packets on its output ports each of the packets having a plurality of in-band control

signals where each one of the in-band control signals is utilized in a corresponding one

of the switching elements as the local in-band control signal for the corresponding

switching element to make switching decisions **(See page 1309, section 7.1, Yang'99**

discloses how each multicast message is forwarded in the network using the

header of the message as an in-band control to determine the destination

address when forwarding from one stage to another), the method comprising:

coding each one of the in-band control signals of the packets into a plurality of bits

based on a predetermined coding algorithm, and generating, with reference to the

coding scheme **(See Table 1 – Yang'99 shows an encoding scheme for tag values**

based on a predetermined coding algorithm),

the output bits of the local output packets at each one of the switching elements

based on a subset of the bits in the corresponding one of the in-band control signals for

each one of the switching elements to route the local input packets arriving at the

corresponding switching element, **(See page 1310, Column 1, Lines 3-20)** wherein

each one of the switching elements is a *bicast cell* **(In Yang'99's system each**

switching element is capable of multicasting and therefore is a bicast cell and the

definition is shown on page 1300, 2nd Column and the corresponding figures are

3A-3F. Yang'99's definition and description of the state of the switching

connection for bicast cell is exactly like the Applicant's description of bicast cell

defined on page 169 of the specification and exactly matches Applicant's Figures

2C-2F) and the local input packets to each one of the switching elements includes idle

(Page 1300 case IV, Page 1306 Lines 13-20, Page 1310 Lines 25-27, Table 1), 0-

bound **(Table 1)**, 1-bound **(Table 1)** and bicast packet types **(Page 1310, Lines 20-25)**,

wherein each one of the packet types corresponds to a distinct in-band control signal

(Cases 1-4 on page 1300 and in general 2nd column on page 1300),

the coding includes coding each of the in-band control <u>signals by two bits</u> **(See in**

Section 5.1, 1st paragraph Yang'99 initially only uses 4 tag values where it is clear

that the in-band control signal can be represented by only two bits. However,

Yang'99 uses 3 bits to represent 6 tag values in Table 1 on page 1306 wherein the

additional 2 tag values are dummy values as indicated by Yang'99 on page 1305.

However, it is clear that such an arrangement wastes in-band bandwidth.),

and the coding algorithm includes coding the bits such that the first bit of the

code for the in-band control signal corresponding to a 0-bound packet type **(See Case 1**

on page 1300) is different from the first bit of the code for the in-band control signal

corresponding to a 1-bound packet type **(See Case 2 on page 1300)**. **(Further Yang**

clearly shows in Table 1 on page 1308 the encoding scheme for the tag values

used as in-band control signal in the packets routed in the multi-stage multicast

switch. Clearly three bits are used adequately meeting the claimed limitation of

"using at least two bits". Also it is evident from Table 1 the first bit of the code

for the 0 bound packet (i.e. tag = 0) is different from the first bit of the 1-bound

packet (i.e. tag = 1) where the first bit is the most significant bit).

Yang'99 fails to disclose that the coding includes coding each one of the in-bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Chen'360. In particular, Chen'360 discloses that the coding includes coding each one of the in-bound control signals by two bits **(Chen'360 shows in Column 4, Lines 4-5 that the in-band routing tag used for self-routing purpose in the multistage is at the minimum 2 bits).**

In view of the above, having the method of Yang'99 and then given the well established teaching of Chen'360, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the method of Yang'99 as taught by Chen'360, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits and results in control simplicity as stated by Chen'360 in Column 2, Lines 59-60.

Regarding **claim 3**, Yang'99 discloses, a method for routing packets through a switching network, wherein the switching network includes multiple stages of switching elements **(See Figures 1, 2, 4, and 5)**, each one of the switching elements receiving packets as local input packets on its input ports and producing packets as local output packets on its output ports each of the packets having a plurality of in-band control signals where each one of the in-band control signals is utilized in a corresponding one of the switching elements as the local in-band control signal for the corresponding switching element to make switching decisions **(See page 1309, section 7.1, Yang'99**

discloses how each multicast message is forwarded in the network using the

header of the message as an in-band control to determine the destination

address when forwarding from one stage to another), the method comprising:

coding each one of the in-band control signals of the packets into a plurality of bits

based on a predetermined coding algorithm, and generating, with reference to the

coding scheme **(See Table 1 – Yang'99 shows an encoding scheme for tag values**

based on a predetermined coding algorithm),

the output bits of the local output packets at each one of the switching elements

based on a subset of the bits in the corresponding one of the in-band control signals for

each one of the switching elements to route the local input packets arriving at the

corresponding switching element, **(See page 1310, Column 1, Lines 3-20)** wherein

each one of the switching elements is a *routing cell* **(In Yang's system each switching**

element is capable of sorting under a linear order of 0-bound, idle, and 1-bound.

This is effectively illustrated on Page 1306, in the second column in the first

paragraph. Given this and the fact that the Applicant defines routing cell on page

161 of the specification simply as a sorting cell associated with a set consisting

of 0-bound, idle, 1-bound and linearly ordered one can easily conclude Yang's

cells are also routing cells.) and the local input packets to each one of the switching

elements includes idle **(Page 1300 case 4, Page 1306 Lines 13-20, Page 1310 Lines**

25-27, Table 1), 0-bound **(Table 1)**, 1-bound **(Table 1)** and bicast packet types **(Page**

1310, Lines 20-25), wherein each one of the packet types corresponds to a distinct in-

band control signal **(Cases 1-4 on page 1300 and in general 2nd column on page**

1300),

the coding includes coding each of the in-band control signals by <u>at least two bits</u>

(See in Section 5.1, 1st paragraph Yang'99 initially only uses 4 tag values where it

is clear that the in-band control signal can be represented by only two bits.

However, Yang'99 uses 3 bits to represent 6 tag values in Table 1 on page 1306

wherein the additional 2 tag values are dummy values as indicated by Yang'99 on

page 1305. However, it is clear that such an arrangement wastes in-band

bandwidth.),

and the coding algorithm includes coding the bits such that the first bit of the

code for the in-band control signal corresponding to a 0-bound packet type **(See Case 1**

on page 1300) is different from the first bit of the code for the in-band control signal

corresponding to a 1-bound packet type **(See Case 2 on page 1300)**. **(Further Yang**

clearly shows in Table 1 on page 1308 the encoding scheme for the tag values

used as in-band control signal in the packets routed in the multi-stage multicast

switch. Clearly three bits are used adequately meeting the claimed limitation of

"using at least two bits". Also it is evident from Table 1 the first bit of the code

for the 0 bound packet (i.e. tag = 0) is different from the first bit of the 1-bound

packet (i.e. tag = 1) where the first bit is the most significant bit.).

Yang'99 fails to disclose that the coding includes coding each one of the in-

bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Chen'360. In particular, Chen'360 discloses that the coding includes coding each one of the in-bound control signals by two bits **(Chen'360 shows in Column 4, Lines 4-5 that the in-band routing tag used for self-routing purpose in the multistage is at the minimum 2 bits).**

In view of the above, having the method of Yang'99 and then given the well established teaching of Chen'360, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the method of Yang'99 as taught by Chen'360, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits and results in control simplicity as stated by Chen'360 in Column 2, Lines 59-60.

Regarding **claim 5**, Yang'99 discloses a system for routing packets comprising: multiple stages of switching elements **(In Yang'99's Figures 1, 2, 4, and 5 contain multiple stages of switching elements)**, each one of the switching elements receiving packets as local input packets on its input ports and producing packets as local output packets on its output ports each of the packets having a plurality of in-band control signals where each one of the in-band control signals is utilized in a corresponding one of the switching elements as the local in-band control signal for the corresponding switching element to make switching decisions **(See page 1309, section 7.1, Yang'99 discloses how each multicast message is forwarded in the network using the**

header of the message as an in-band control to determine the destination

address when forwarding from one stage to another),

an encoder **(to perform the encoding scheme shown in table 1 on page 1306**

an encoder has to be part of each switching element) for coding each one of the in-

band control signals of the packets into a plurality of bits based on a predetermined

coding algorithm, and

a generator **(The scatter network in Figure 4A of the Reverse Banyan**

Network generates the tags as shown in figure 4B) for generating, with reference to

the coding scheme **(See Table 1 on page 1306 – Yang'99 shows an encoding**

scheme for tag values based on a predetermined coding algorithm), the output bits

of the local output packets at each one of the switching elements based on a subset of

the bits in the corresponding one of the in-band control signals for each one of the

switching elements to route the local input packets arriving at the corresponding

switching element, **(See page 1310, Column 1, Lines 3-20)** wherein each one of the

switching elements is a *bicast cell* **(In Yang'99's system each switching element is**

capable of multicasting and therefore is a bicast cell and the definition is shown

on page 1300, 2nd Column and the corresponding figures are 3A-3F. Yang'99's

definition and description of the state of the switching connection for bicast cell

is exactly like the Applicant's description of bicast cell defined on page 169 of the

specification and exactly matches Applicant's Figures 2C-2F) and the local input

packets to each one of the switching elements includes idle **(Page 1300 case IV, Page**

1306 Lines 13-20, Page 1310 Lines 25-27, Table 1), 0-bound **(Table 1)**, 1-bound

(Table 1) and bicast packet types **(Page 1310, Lines 20-25)**,

wherein each one of the packet types corresponds to a distinct in-band control

signal **(Cases 1-4 on page 1300 and in general 2nd column on page 1300)**, the

coding includes coding each of the in-band control signals by two bits **(See in Section**

5.1, 1st paragraph Yang'99 initially only uses 4 tag values where it is clear that the

in-band control signal can be represented by only two bits. However, Yang'99

uses 3 bits to represent 6 tag values in Table 1 on page 1306 wherein the

additional 2 tag values are dummy values as indicated by Yang'99 on page 1305.

However, it is clear that such an arrangement wastes in-band bandwidth.),

and the coding algorithm includes coding the bits such that the first bit of the

code for the in-band control signal corresponding to a 0-bound packet type **(See Case 1**

on page 1300) is different from the first bit of the code for the in-band control signal

corresponding to a 1-bound packet type **(See Case 2 on page 1300)**. **(Further Yang**

clearly shows in Table 1 on page 1308 the encoding scheme for the tag values

used as in-band control signal in the packets routed in the multi-stage multicast

switch. Clearly three bits are used adequately meeting the claimed limitation of

"using at least two bits". Also it is evident from Table 1 the first bit of the code

for the 0 bound packet (i.e. tag = 0) is different from the first bit of the 1-bound

packet (i.e. tag = 1) where the first bit is the most significant bit).

Yang'99 fails to disclose that the coding includes coding each one of the in-

bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Chen'360. In particular, Chen'360 discloses that the coding includes coding each one of the in-bound control signals by two bits **(Chen'360 shows in Column 4, Lines 4-5 that the in-band routing tag used for self-routing purpose in the multistage is at the minimum 2 bits).**

In view of the above, having the system of Yang'99 and then given the well established teaching of Chen'360, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the system of Yang'99 as taught by Chen'360, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits and results in control simplicity as stated by Chen'360 in Column 2, Lines 59-60.

Regarding **claim 6**, Yang'99 discloses, a system for routing packets comprising: multiple stages of switching elements **(In Yang'99's Figures 1, 2, 4, and 5 contain multiple stages of switching elements)**, each one of the switching elements receiving packets as local input packets on its input ports and producing packets as local output packets on its output ports each of the packets having a plurality of in-band control signals where each one of the in-band control signals is utilized in a corresponding one of the switching elements as the local in-band control signal for the corresponding switching element to make switching decisions **(See page 1309, section 7.1, Yang'99 discloses how each multicast message is forwarded in the network using the**

header of the message as an in-band control to determine the destination

address when forwarding from one stage to another),

an encoder **(to perform the encoding scheme shown in table 1 on page 1306**

an encoder has to be part of each switching element) for coding each one of the in-

band control signals of the packets into a plurality of bits based on a predetermined

coding algorithm, and

a generator **(The scatter network in Figure 4A of the Reverse Banyan**

Network generates the tags as shown in figure 4B) for generating, with reference to

the coding scheme **(See Table 1 – Yang'99 shows an encoding scheme for tag**

values based on a predetermined coding algorithm), the output bits of the local

output packets at each one of the switching elements based on a subset of the bits in

the corresponding one of the in-band control signals for each one of the switching

elements to route the local input packets arriving at the corresponding switching

element, **(See page 1310, Column 1, Lines 3-20)** wherein each one of the switching

elements is a *routing cell* **(In Yang's system each switching element is capable of**

sorting under a linear order of 0-bound, idle, and 1-bound. This is effectively

illustrated on Page 1306, in the second column in the first paragraph. Given this

and the fact that the Applicant defines routing cell on page 161 of the

specification simply as a sorting cell associated with a set consisting of 0-bound,

idle, 1-bound and linearly ordered one can easily conclude Yang's cells are also

routing cells.) and the local input packets to each one of the switching elements

includes idle **(Page 1300 case 4, Page 1306 Lines 13-20, Page 1310 Lines 25-27,**

Table 1), 0-bound **(Table 1)**, 1-bound **(Table 1)** and bicast packet types **(Page 1310,**

Lines 20-25), wherein each one of the packet types corresponds to a distinct in-band

control signal **(Cases 1-4 on page 1300 and in general 2nd column on page 1300)**,

the coding includes coding each of the in-band control signals by at least two bits **(See**

in Section 5.1, 1st paragraph Yang'99 initially only uses 4 tag values where it is

clear that the in-band control signal can be represented by only two bits.

However, Yang'99 uses 3 bits to represent 6 tag values in Table 1 on page 1306

wherein the additional 2 tag values are dummy values as indicated by Yang'99 on

page 1305. However, it is clear that such an arrangement wastes in-band

bandwidth.), and the coding algorithm includes coding the bits such that the first bit of

the code for the in-band control signal corresponding to a 0-bound packet type **(See**

Case 1 on page 1300) is different from the first bit of the code for the in-band control

signal corresponding to a 1-bound packet type **(See Case 2 on page 1300). (Further**

Yang clearly shows in Table 1 on page 1308 the encoding scheme for the tag

values used as in-band control signal in the packets routed in the multi-stage

multicast switch. Clearly three bits are used adequately meeting the claimed

limitation of "using at least two bits". Also it is evident from Table 1 the first bit

of the code for the 0 bound packet (i.e. tag = 0) is different from the first bit of the

1-bound packet (i.e. tag = 1) where the first bit is the most significant bit.).

Yang'99 fails to disclose that the coding includes coding each one of the in-

bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Chen'360. In particular, Chen'360 discloses that the coding includes coding each one of the in-bound control signals by two bits **(Chen'360 shows in Column 4, Lines 4-5 that the in-band routing tag used for self-routing purpose in the multistage is at the minimum 2 bits).**

In view of the above, having the system of Yang'99 and then given the well established teaching of Chen'360, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the system of Yang'99 as taught by Chen'360, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits and results in control simplicity as stated by Chen'360 in Column 2, Lines 59-60.

Regarding **claim 11**, Yang'99 discloses a method, further comprising: determining when two of the local input packets comprise idle **(see Page 1300 case 4)** and bi-cast packet types **(Page 1310, Lines 20-25)** that are received at respective ones of the input ports **(See Page 1306 Lines 13-20, Page 1310 Lines 25-27, Table 1 used for routing packets in switch ports shown in Fig, 3)**;
bicasting or copying the bicast packet to generate at least two copies of the bicast packet and sending each of the copied bicast packets to respective ones of output ports **(See Section 3 on page 1301 2nd paragraph that shows the bicasting as a broadcast operation in Fig. 3C and 3D to the respective outputs of the 2x2 switch)**; and

changing the copied bicast packet sent to one of the output ports to a O-bound **(See Figs. 3(c) and 3(d) O-bound 1-bound outputs)** packet type and changing the copied bicast packet sent to the other output port to a 1-bound packet type **(See Section 3 on page 1301 2ⁿᵈ paragraph that shows the bicasting as a broadcast operation in Fig. 3C and 3D and changing the packets to a O-bound and 1-bound packets)**.

Regarding **claim 12**, it is noted that the limitations of claim 12 corresponds to that of claim 11 as discussed above, please see the Examiner's comments with respect to claim 11 as set forth in the rejection above.

Regarding **claim 13**, it is noted that the limitations of claim 13 corresponds to that of claim 11 as discussed above, please see the Examiner's comments with respect to claim 11 as set forth in the rejection above.

Regarding **claim 14**, it is noted that the limitations of claim 14 corresponds to that of claim 11 as discussed above, please see the Examiner's comments with respect to claim 11 as set forth in the rejection above.

Conclusion

6.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to HABTE MERED whose telephone number is (571)272-6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Aung S. Moe can be reached on 571 272 7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aung S. Moe/   /Habte Mered/
Supervisory Patent Examiner, Art Unit 2416   Examiner, Art Unit 2616

1-20-08